'TRADER' SERVICE SHEET

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AERODYNE 52

AND MODEL 60 RADIO-GRAM

THE chassis fitted in the Aerodyne 52 receiver is a 3-valve (plus rectifier) A.C. 3-band type, with a short-wave range of 16·5-50 metres.

A very similar chassis is fitted in the model 60 radio-gramophone, which, however, has pick-up switching and an automatic bias circuit for **V2**. This *Service Sheet* was prepared on the table model.

CIRCUIT DESCRIPTION

Two alternative aerial input connections. **A1** includes Droitwich rejector **L1, C15,** and **A2** goes direct to coupling coils **L6** (S.W.), **L2** (M.W.) and **L4** (L.W.). On M.W. and L.W. input is via capacity coupled band-pass filters. Primaries **L3** (M.W.), **L5** (L.W.), are tuned by **C16**; secondaries **L8** (M.W.), **L9** (L.W.), are tuned by **C20**; common coupling condenser **C1.** On S.W. band input is via single tuned circuit comprising **L7** and **C20.**

First valve (**V1, Mullard metallised VP4B**) is a variable-mu pentode operating as radio frequency amplifier with gain control by variable cathode resistance **R4** which varies G.B. applied.

Tuned-anode coupling by **L11, C25** (S.W.), **L13, C25** (M.W.) and **L14, C25** (L.W.) between **V1** and triode detector (**V2, Mazda metallised AC/HL**) which operates on grid leak system with **C5** and **R7.** Reaction is applied from anode by coils **L10** (S.W.) and **L12** (M.W. and L.W.) and controlled by variable condenser **C22.** Provision for connection of gramophone pick-up in grid circuit. H.F. filtering in anode circuit by **R11, R10, L15** and condensers **C8, C26.**

Resistance-capacity coupling by **R9, C19** and **R13** between detector and pentode output valve (**V3, Mullard Pen A4**). Fixed tone correction in anode circuit by R.C. filter **R15, C10.** Provision for connection of low-impedance external speaker across secondary of internal speaker transformer **T1.**

H.T. current is supplied by I.H.C. full-wave rectifying valve (**V4, Mullard IW4/350**). Smoothing by speaker field coil **L18** and dry electrolytic condensers **C12, C13.** Mains aerial coupling by **C14.**

DISMANTLING THE SET

Removing Chassis.—First remove the reaction and volume control knobs (pull off) and the tuning and switch knobs (recessed grub screws). Then remove the two round-head wood screws holding the top of the tuning scale and the three bolts (with washers) holding the chassis to the bottom of the cabinet.

By tilting the back upwards, the chassis can now be withdrawn to the extent of the speaker leads, which should be just sufficient for normal purposes.

To free the chassis entirely, unsolder the speaker leads and *when replacing*, connect them as follows, numbering the tags from bottom to top: 1, black; 2, blue; 3 and 4, blank; 5 and 6 joined together, red. The blue rubber-covered lead is soldered to frame of speaker.

Removing Speaker.—To remove the speaker from the cabinet, slacken the four clamps (nuts and lock nuts) and remove the two round-head wood screws (with washers) which hold the speaker to the sub-baffle. *When replacing*, see that the transformer is on the right.

COMPONENTS AND VALUES

CONDENSERS		Values (μF)
C1	Band-pass coupling	0·02
C2	V1 S.G. by-pass	0·1
C3	V1 cathode by-pass	0·1
C4	V1 anode decoupling	0·1
C5	V2 grid condenser	0·00005
C6	V2 anode decoupling	1·0
C7	V2 heater by-pass	0·01
C8	V2 anode H.F. by-pass	0·0005
C9	V2 to V3 L.F. coupling	0·01
C10	Part of T.C. filter	0·01
C11*	V3 cathode by-pass	25·0
C12*	H.T. smoothing	8·0
C13*		8·0
C14	Mains aerial coupling	0·0002
C15‡	Droitwich rejector tuning	0·002
C16†	Band-pass primary tuning	0·00035
C17‡	Band-pass primary trimmer	—
C18‡	Band-pass sec. L.W. trimmer	0·000035
C19‡	Band-pass sec. M.W. trimmer	0·000035
C20†	Band-pass sec. and S.W. tuning	0·00035
C21‡	Aerial S.W. trimmer	—
C22†	Reaction control	0·0005
C23‡	V1 anode circuit L.W. trimmer	0·000035
C24‡	V1 anode circuit M.W. trimmer	0·000035
C25†	V1 anode circuit tuning	0·00035

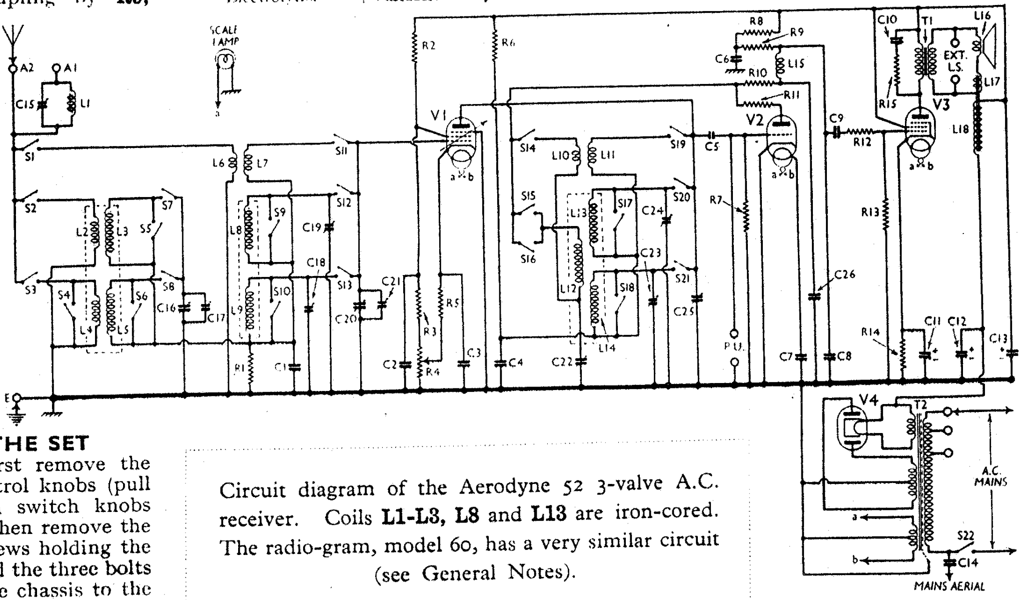
* Electrolytic. † Variable. ‡ Pre-set.

RESISTANCES		Values (ohms)
R1	V1 C.G. decoupling	1,000
R2	V1 S.G. H.T. potential divider	20,000
R3		20,000
R4	V1 gain control	10,000
R5	V1 fixed G.B. resistance	140
R6	V1 anode decoupling	8,000
R7	V2 grid leak	500,000
R8	V2 anode decoupling	20,000
R9	V2 anode load	50,000
R10	V2 anode H.F. stoppers	5,000
R11		40
R12	V3 C.G. H.F. stopper	100,000
R13	V3 C.G. resistance	500,000
R14	V3 G.B. resistance	140
R15	Part of T.C. filter	20,000

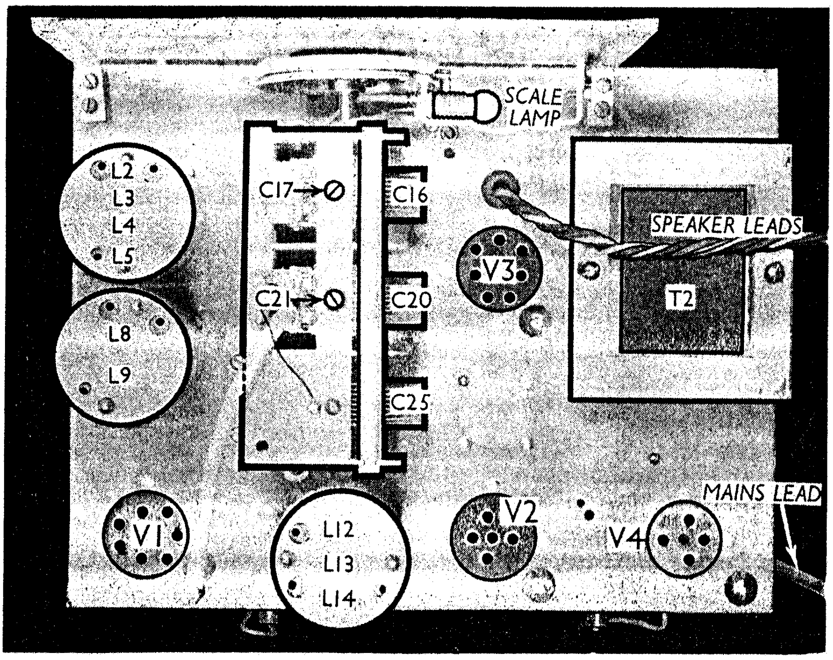
OTHER COMPONENTS			Approx. Values (ohms)
L1	Droitwich rejector coil		1·5
L2	Aerial M.W. coupling coil		0·3
L3	M.W. band-pass primary		1·5
L4	Aerial L.W. coupling coil		15·0
L5	L.W. band-pass primary		16·0
L6	Aerial S.W. coupling coil		0·3
L7	Aerial S.W. tuning coil		0·05
L8	M.W. band-pass secondary		1·5
L9	L.W. band-pass secondary		16·0
L10	S.W. reaction coil		0·3
L11	V1 anode S.W. tuning coil		0·05
L12	M.W. and L.W. reaction coil		3·0
L13	V1 anode M.W. tuning coil		1·5
L14	V1 anode L.W. tuning coil		16·0
L15	V2 anode H.F. choke		200·0
L16	Speaker speech coil		2·2
L17	Hum neutralising coil		0·1
L18	Speaker field coil		2,000·0
T1	Speaker input trans.	Pri.	600·0
		Sec.	0·25
T2	Mains trans.	Pri. total	25·0
		Heater sec.	0·05
		Rect. heat. sec.	0·05
		H.T. sec. total	450·0
S1-21	Waveband switches		—
S22	Mains switch, ganged R4		—

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 2) are those measured in



Circuit diagram of the Aerodyne 52 3-valve A.C. receiver. Coils L1-L3, L8 and L13 are iron-cored. The radio-gram, model 60, has a very similar circuit (see General Notes).



Plan view of the chassis. Note that there is no trimmer above **C25.**

our receiver when it was operating on mains of 215 V, using the 230 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but the reaction control was at minimum. There was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VP4B ..	170	4·9	110	1·8
V2 AC/HL	50	2·0	—	—
V3 PenA4..	190	30·0	210	4·1
V4 IW4/350	265†	—	—	—

† Each anode, A.C.

GENERAL NOTES

Switches.—**S1-S21** are the wavechange switches, in three ganged rotary units beneath the chassis, indicated by numbers in circles in the under-chassis view. The arrows show the directions in which the units are viewed in the diagrams on this page. The table below gives the switch positions for the three control settings, O indicating open, and C, closed.

Switch	L.W.	M.W.	S.W.
S1	O	O	C
S2	O	C	O
S3	C	O	O
S4	O	C	O
S5	O	O	C
S6	O	C	O
S7	O	C	O
S8	C	O	O
S9	O	O	C
S10	O	C	O
S11	O	O	C
S12	O	C	O
S13	C	O	O
S14	O	O	C
S15	O	C	O
S16	C	O	O
S17	O	O	C
S18	O	C	O
S19	O	O	C
S20	O	C	O
S21	C	O	O

S22 is the Q.M.B. mains switch, ganged with the gain control **R4.**

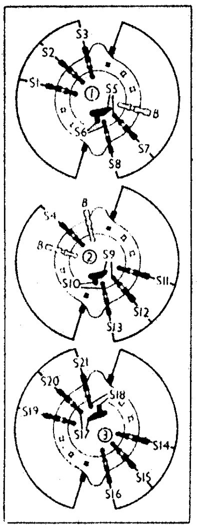
Coils.—**L1** is beneath the chassis; **L2-L5, L8, L9** and **L12-L14** are in three screened units on the chassis deck; while **L6, L7** and **L10, L11** are on two tubular units beneath the chassis. **L7** and **L11** are the thick wire windings, **L6** and **L10,** each consisting of about one turn of fine wire close to one end of **L7** and **L11** respectively. **L15** is also beneath the chassis.

External Speaker.—Two sockets are provided on **T1** terminal panel for a low resistance (about 2O) external speaker.

Scale Lamp.—This is an Osram M.E.S. type rated at 3.5 V, 0.15 A.

Condensers C12, C13.—These are two 8 μF dry electrolytics in a single unit beneath the chassis, with a common negative (black) lead. The red lead to the **V4** valve-holder is the positive of **C12,** and the red lead to one end of **R2** (H.T. line) the positive of **C13.**

Alternative Valves.—**V2,** Mullard 354V or Mazda AC/HL; **V3,** Mullard Pen 4 VB or Pen A4; **V4,** Mullard IW3 or IW4/350.



Switch diagrams, looking from the rear of the underside of the chassis. The units are numbered as in the under-chassis view.

Chassis Divergencies.—In some chassis **C26** may be 0.0005 μF (not 0.001 μF), and may be connected from the top of **L12** to chassis. **R15** may not occur in some chassis, **C10** being directly across the primary of **T1.**

Radio-gram Modifications.—In the radio-gram (Model 60) the circuit is identical except for certain additions. One pick-up socket goes to chassis, as in the table model, but the other goes to the fixed contact of an extra switch. The junction

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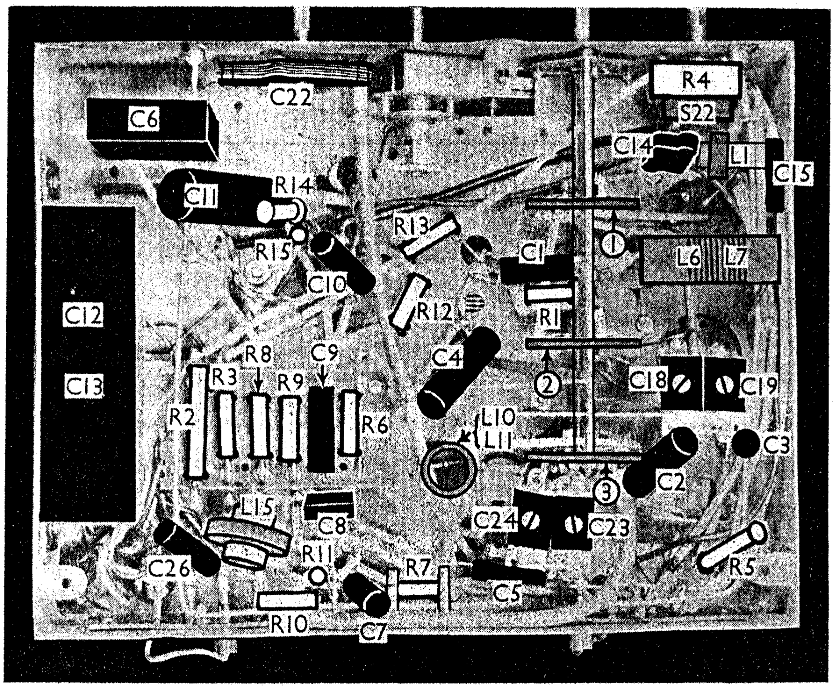

Under-chassis view. **L6, L7** and **L10, L11** are S.W. coil units.

MAINTENANCE PROBLEMS

Hints Contributed by Service Engineers

Grid Emission ?

MANY obscure faults in radio sets are due to valves, the usual method of tracing being to plug in a new one. But how many of us take the trouble to find out the actual defect ?

Recently I had a KB427 in for service which was found to fade out on the weaker stations after about five minutes' use. It was fairly obvious that either the F.C. or I.F. valve was at fault, but I had no others (13 V heaters) to test with.

A meter in the anode circuit of each valve showed the current was below normal on strong signals but *above* normal on weak stations. A test of the A.V.C. line with a simple valve voltmeter showed that it was *positive* with respect to earth.

The F.C. and double diode valves were then removed but still the positive potential existed, and this gave the clue to the trouble—grid emission in the I.F. valve when warmed up.

If the circuit is examined it will be found that when electrons leave the grid they will be attracted to the anode and return via the H.T. circuit and A.V.C. diode load, thus considerably damping the R.F. input from the I.F. transformer. —G. STUART, E. DULWICH.

Broken Aerial Wire

WE were asked to service a Det. and 2 L.F. set of the home-constructed type. The owner explained that when a station was tuned in at, say, 60 on the dial (this being the old numbered sort) it would suddenly fade away, but could be again received at another point, say, 49.

We at once investigated, but after testing everything and finding no trace of the trouble, the customer was asked to keep a close record of what happened and take note of the times. This was done, and to all accounts the fault was of an intermittent nature, and sometimes did not happen for days at a stretch. We then took the set to the test bench to make a diagnosis and repair of the fault, and to our surprise it worked properly, with no trouble whatever.

The next step was to return the receiver and test the aerial-earth system, and even then nothing could be found out of place. However, upon opening a door through which the aerial passed we at last found the trouble. The opening of the door caused the aerial lead-in to be squeezed in the door jamb, and the wire was broken inside the insulation and could thus not be found by just looking at it. The aerial was at times disconnected, leaving only a length of about 5 ft. to operate the set. Vibration, and the opening or closing of the door caused the trouble at odd times.—J. A. W. CHURCHILL, WAREHAM.

Unusual Case of Interference

A COMPLAINT was received recently from a customer with a new A.C. superhet that Midland Regional could be heard when the L.W. National was being received. A call was given, but the trouble did not then appear, and the customer was asked to report if it occurred again.

In a few days' time he did come in again and stated that the interference was now worse, and that the two stations could sometimes be heard at almost equal strength, with the National disappearing altogether at times. The trouble, he said, was at its worst that evening, and as he had left the set running I decided to go right away and hear it.

Having received a few other complaints recently that the Regional programme could be heard faintly behind the L.W. National, I took a new set, of a similar type to the customer's, with me. We do get peculiar things happen in this area, being situated only about eight miles from the Droitwich masts, and I thought it would be a good opportunity to make a test.

On arrival at the house, sure enough, Midland was rattling along merrily with the National, both stations giving a talk at the time. A quick inspection showed that the set was connected O.K., and nothing abnormal was noticed when the back was removed. The new set was quickly connected and tuned to 1,500 metres, and was quite normal. Then the customers set was tried again and this also was O.K. now.

I left the new set with the customer and asked him to listen for any interference over the week-end while taking his set away for a similar trial. Well, both sets performed perfectly over the week-end and the customer's set was taken down to the workshop for inspection.

The set ran for some hours on a broadcast test and gave no trouble, and was then removed from the cabinet and reconnected. Tests on the switches and coils failed to reveal any trouble and it was decided to try and produce the fault. Eventually, I found that on lifting one of the coil cans, a crackle appeared and Midland came in behind the L.W. National.

Here at last was a clue, for this was the aerial coil, and the crackle could not be produced when the set was switched to medium wave. The coil was dismantled and a close inspection revealed the fact that the L.W. section of the aerial coil had its lead brought through a hole in the coil former, in the usual way, with the medium wave section lead alongside. The L.W. lead was broken off about a quarter of an inch short so that only the medium wave lead was soldered to the tag, the L.W. lead making a rubbing contact only with the other one. When the set was moved or sometimes, when a switch was turned, the vibration must have caused this loose wire to move and break contact. This fault would cause break through from the powerful local signals.

Repairing the join and retrimming the set proved to have cleared the fault, and no more complaints have been received from this customer.—W. G. GOUGH, WORCESTER.

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AERODYNE MODEL 52 (and 60)

between **C5** and **R7** goes to the fixed contacts of three further switches (which are common). The control grid of **V2** goes to the common moving contact of the four switches. The pick-up is connected direct to grid in the gram. position while on radio it is disconnected. On gram. the radio input is disconnected.

In addition, **R7** is taken to cathode of **V2,** and not to chassis, while between cathode and chassis a bias resistance of 500 O is connected. In parallel with this is a 25 μF 15 V peak electrolytic condenser.

CIRCUIT ALIGNMENT

S.W.—Feed in a 19 m. signal from the signal generator to the **A2** and **E** sockets. Tune it in on the receiver, and adjust **C21** for maximum output, rocking the gang for optimum results. Feed in a 50 m. signal and tune it in. If set needs re-alignment here and calibration is correct, adjust loose turn on **L7** so that the minimum amount of reaction is needed to cause the set to oscillate. If calibration is wrong at 50 m., adjust loose turn on **L11** first, then proceed as above with **L7.**

M.W.—Adjust **C24** for correct calibration at 250 m., then adjust **C19** and **C17**.

L.W.—Whilst rocking the gang slightly adjust **C23** for maximum signals at 1,300 m., then adjust **C18.**

C21 should not be touched after it has been adjusted for S.W.

Droitwich Rejector.—Feed in a 1,500 m.. signal to **A1** and **E,** tune it in, and adjust **C15** (at side of chassis) for *minimum* output.